

fluorophores, chemiluminescent compounds, or radioactive atoms 415-418. Labeled target DNA or RNA hybridizes through base pairing interactions to the complementary probe DNA, synthesized on the surface of the array. Figure 5 shows a number of such target molecules 502-504 hybridized to complementary probes 505-
5 507, which are in turn bound to the surface of the array 402. Targets, such as labeled DNA molecules 508 and 509, that do not contain nucleotide sequences complementary to any of the probes bound to array surface, do not hybridize to generate stable duplexes and, as a result, tend to remain in solution. The sample solution is then rinsed from the surface of the array, washing away any unbound
10 labeled DNA molecules. Finally, the bound labeled DNA molecules are detected via optical or radiometric scanning. Figure 6 shows labeled target molecules emitting detectable fluorescence, radiation, or other detectable signal. Optical scanning involves exciting labels of bound labeled DNA molecules with electromagnetic radiation of appropriate frequency and detecting fluorescent emissions from the
15 labels, or detecting light emitted from chemiluminescent labels. When radioisotope labels are employed, radiometric scanning can be used to detect the signal emitted from the hybridized features. Additional types of signals are also possible, including electrical signals generated by
20 bound target molecules, magnetic target molecules, and other such
25 bound target molecules that can signal. Optical, radiometric, or scanning produce an analog or digital representation of the array as shown in Figure 7, with features to which labeled target molecules are hybridized similar to
30 706 optically or digitally differentiated from those features to which no labeled DNA molecules are bound. In other words, the analog or digital representation of a scanned array displays positive signals for features to which labeled DNA molecules are hybridized and displays negative features to which no, or an undetectably small number of, labeled DNA molecules are bound. Features displaying positive signals in
35 the analog or digital representation indicate the presence of DNA molecules with complementary nucleotide sequences in the original sample solution. Moreover, the

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